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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/761,058	SUN, ZHAOHUI	
	Examiner	Art Unit	
	Chikaodili E. Anyikire	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20040420*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This application is responsive to application number (10761058) filed on January 20, 2004. Claims 1-27 are pending and have been examined.

Information Disclosure Statement

2. Acknowledgement is made of applicant's information disclosure statement.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claim 25 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 9, 19, and 27 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamada et al (US 5,543,855).

As per claim 1, Yamada et al discloses a method for reducing tone scale of a video, said video having a plurality of frames, each of the frames having a plurality of pixels, the method comprising the steps of:

adding a cumulative diffused error to an initial tone value of a base pixel of a current frame of said video to provide an adjusted tone value of said base pixel (Yamada, Fig 3, element 102; Col 3 Ln 50-55);

assigning a threshold to said base pixel (Col 3 Ln 55-62);

quantizing said adjusted tone value using said threshold, said quantizing generating a quantization error (Abstract and Col 2 Ln 52-67);

diffusing first portions of said quantization error to one or more pixels of one or more succeeding frames temporally neighboring said current frame and second portions of said quantization error to one or more pixels spatially neighboring said base pixel (Fig 3, element 107; Col 4 Ln 10-41);

totaling said portions diffused to each said neighboring pixel to provide a respective cumulative diffused error (Col 3 Ln 50-55 and Col 4 Ln 10-41);

iterating said assigning, quantizing, and diffusing steps with one of said neighboring pixels as base pixel until all of the pixels on all of the video frames are processed (Figs 4 and 5; Col 5 Ln 3-15).

As per claim 9, Yamada et al discloses the method of claim 1 wherein said adaptively adjusting is a function of the initial tone values of said base pixel and of

temporally neighboring pixels at the same spatial location (Col 3 Ln 50-55 and Col 5 Ln 3-15).

As per claim 19, the method of claim 1 wherein said diffusing of said first portions and said diffusion of said second portions is separable (Col 4 Ln 12 – 35).

As per claim 27, Yamada et al discloses a system comprising the combination of said apparatus and a source supplying said initial video (Fig 1; Col 2 Ln 52 – Col 3 Ln 7).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al (US 5,543,855) in view of Damera-Venkata et al, "Adaptive Threshold Modulation for Error Diffusion Halftoning".

As per claim 2, Yamada et al disclose the method of claim 1.

However, Yamada et al does not explicitly teach further comprising adaptively adjusting said threshold during said iterating.

In the same field of endeavor, Damera-Venkata et al teach further comprising adaptively adjusting said threshold during said iterating (Sec 2B, Sec 3, and Sec 4).

Therefore, it would have been obvious for one having ordinary skill in the art to have modified the invention of Yamada et al with the invention of Damera-Venkata et al. The adaptive threshold minimizes the distortion in the halftone.

10. Claims 3, 5, 10-15, and 20-26 rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al (US 5,543,855) in view of Damera-Venkata et al, "Adaptive Threshold Modulation for Error Diffusion Halftoning" in further view of Tanaka et al (US 6,148,101).

As per claim 3, the modified invention of Yamada et al disclose the method of claim 2 wherein said adaptively adjusting further comprises:

generating a gain control map (Yamada, Fig 2, element 33, masking unit) and a temporal diffusion map (Yamada, diffusion matrix) from said motion fields (Fig 3, element 107; Col 4 Ln 12-23); and

applying said maps during said quantizing and diffusing steps, respectively (Col 3 Ln 50 – Col 4 Ln 22).

However, modified invention of Yamada et al does not explicitly teach determining motion fields between said current frame and said temporally neighboring frames.

In the same field of endeavor, Tanaka et al teach determining motion fields between said current frame and said temporally neighboring frames (Tanaka, Fig 13, element 108; Col 27 Ln 19-22).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the modified invention of Yamada et al with the invention of Tanaka et al. The advantage of the invention of Tanaka et al is that it provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

As per claim 5, the modified device of Yamada et al disclose the method of claim 2 wherein said is adaptively adjusted (Damera-Venkata, Sec 2B, Sec 3, and Sec 4).

However, the modified invention of Yamada et al does not explicitly teach that said function is a function of the motion between said current frame and said temporally neighboring video frames.

In the same field of endeavor, Tanaka et al teach a function of the motion between said current frame and said temporally neighboring video frames (Fig 13, 108; Col 27 Ln 19-22 and Col 30 Ln 15-19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the modified invention of Yamada et al with the invention of Tanaka et al. The advantage of the invention of Tanaka et al is that it provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

As per claim 10, Yamada et al disclose the method of claim 1 further comprising the steps of:

generating a gain control map (Yamada, Fig 2, element 33, masking unit) from said motion fields (Yamada et al, Fig 3, element 107; Col 4 Ln 12-23).

However, Yamada et al does not explicitly teach adaptively adjusting said threshold during said iterating according to said gain control map.

In the same field of endeavor, Damera-Venkata et al teach adaptively adjusting said threshold during said iterating according to said gain control map (Damera-Venkata, Sec 2B, Sec 3, and Sec 4).

However, modified invention of Yamada does not explicitly teach determining motion fields between said current frame and said temporally neighboring frames.

In the same field of endeavor, Tanaka et al teach determining motion fields between said current frame and said temporally neighboring frames (Fig 13, element 108; Col 27 Ln 19-22).

Therefore, it would have been obvious for one having ordinary skill in the art to have modified the invention of Yamada et al with the invention of Damera-Venkata et al.

The adaptive threshold minimizes the distortion in the halftone (Damera-Venkata, Sec 4 Ln 1-8).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the modified invention of Yamada et al with the invention of Tanaka et al. The advantage of the invention of Tanaka et al is that it provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

As per claim 11, Yamada et al discloses the method of claim 10 further comprising smoothing said gain control map (Yamada, masking unit and diffusion matrix; Col 4 Ln 12-23).

As per claim 12, modified invention of Yamada et al discloses the method of claim 10 further comprising generating a temporal diffusion map from said motion fields, said temporal diffusion map defining said neighboring pixels prior to said diffusing (Yamada, Fig 3, element 107; Col 4 Ln 12-23).

As per claim 13, modified invention of Yamada et al discloses the method of claim 10.

However, modified invention of Yamada et al does not explicitly teach wherein said motion fields are determined by motion estimation computations.

In the same field of endeavor, Tanaka et al teach wherein said motion fields are determined by motion estimation computations (Fig 13, element 108; Col 27 Ln 19-22 and Col 30 Ln 15-19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the modified invention of Yamada et al with the invention of Tanaka et al. The advantage of the invention of Tanaka et al is that it provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

As per claim 14, modified invention of Yamada et al discloses the method of claim 13 wherein said motion estimation computations are gradient-based, region-based, energy-based, or transform-based (Tanaka, Fig 13, element 108; Col 27 Ln 19-22 and Col 30 Ln 15-19).

As per claim 15, modified invention of Yamada et al discloses the method of claim 10.

However, modified invention of Yamada et al does not explicitly teach wherein said determining motion fields further comprises reading motion vector metadata associated with said frames.

However, the examiner takes official notice to wherein said determining motion fields further comprises reading motion vector metadata associated with said frames.

A standard procedure of MPEG inter-frame compression, which provides motion vector data as part of the encoding.

As per claim 20, Yamada et al disclose apparatus for reducing tone scale of an initial video having a plurality of frames, said video comprising:

a parameter estimation module determining a motion-assisted gain control map and a temporal diffusion map, said gain control map defining a plurality of thresholds (Fig 3, element 107; Col 3 Ln 44-62 and Col 4 Ln 12-23),

a quantization module quantizing the initial video according to said thresholds, said quantizing defining quantization error (Abstract and Col 2 Ln 52-67);

a temporal error diffusion module diffusing first portions of the quantization error along said motion vectors responsive to said diffusion map (Fig 3, element 107; Col 4 Ln 12-23);

a spatial error diffusion module diffusing second portions of the quantization error spatially (Fig 3, element 107; Col 4 Ln 12-23).

However, Yamada et al does not explicitly teach a motion estimation module determining motion vectors between temporally adjacent frames.

In the same field of endeavor, Tanaka et al teach a motion estimation module determining motion vectors between temporally adjacent frames (Tanaka, Fig 13, element 108; Col 27 Ln 19-22).

However, modified invention of Yamada et al does not explicitly teach.

In the same field of endeavor, Damera-Venkata et al teach said thresholds being adaptive to said motion vectors.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the modified invention of Yamada et al with the invention of Tanaka et al. The advantage of the invention of Tanaka et al is that it

provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

Therefore, it would having been obvious for one having ordinary skill in the art to have modified the invention of Yamada et al with the invention of Damera-Venkata et al. The adaptive threshold minimizes the distortion in the halftone (Damera-Venkata, Sec 4 Ln 1-8).

Regarding claim 21, arguments analogous to those presented for claim 13 are applicable to claim 21.

Regarding claim 22, arguments analogous to those presented for claim 14 are applicable to claim 22.

Regarding claim 23, arguments analogous to those presented for claim 15 are applicable to claim 23.

As per claim 24, Yamada et al discloses the apparatus of claim 20 further comprising a display operatively connected to said modules (Fig 1, elements 12, 21, and 22; Col 2 Ln 52-Col 3 Ln 7).

As per claim 25, Yamada et al discloses the apparatus of claim 24 wherein said display is incapable of displaying said initial video (Col 2 Ln 52- Col 3 Ln 20; the prior art discloses that the initial video changes, which wouldn't be able to be displayed by the display).

As per claim 26, Yamada et al discloses the apparatus of claim 25 wherein said display is portable (Fig 1, element 22; Col 2 Ln 52-Col 3 Ln 7).

11. Claims 7, 8, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al (US 5,543,855) in view of Tanaka et al (US 6,148,101).

As per claim 7, Yamada et al disclose the method of claim 1 wherein said diffusing of said first portions (Fig 3, 107; Col 4 Ln 12-22).

However, modified invention of Yamada et al does not explicitly teach along motion trajectories.

In the same field of endeavor, Tanaka et al teach along motion trajectories (Fig 13, element 108; Col 27 Ln 19-22 and Col 30 Ln 15-19 and Col 30 Ln 57 – Col 31 Ln 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the modified invention of Yamada et al with the invention of Tanaka et al. The advantage of the invention of Tanaka et al is that it provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

As per claim 8, modified invention of Yamada et al disclose the method of claim 7.

However, Yamada et al does not explicitly teach further comprising bilinearly interpolating at non-integer locations along said motion trajectories.

However, the examiner takes official notice to further comprising bilinearly interpolating at non-integer locations along said motion trajectories.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the modified invention of Yamada et al with the invention of Tanaka et al to interpolate along the motion trajectories. The advantage

of the invention of Tanaka et al is that it provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

As per claim 16, Yamada et al disclose the method of claim 1 further comprising the steps of:

generating a temporal diffusion map from said motion fields, said temporal diffusion map defining said neighboring pixels prior to said diffusing (Fig 3, element 107; Col 4 Ln 12-23).

However, Yamada et al does not explicitly teach determining motion fields between said current frame and said temporally neighboring frames.

In the same field of endeavor, Tanaka et al teach determining motion fields between said current frame and said temporally neighboring frames (Fig 13, element 108; Col 27 Ln 19-22 and Col 30 Ln 15-19 and Col 30 Ln 57- Col 31 Ln 4).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the invention of Yamada et al with the invention of Tanaka et al. The advantage of the invention of Tanaka et al is that it provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

As per claim 17, Yamada et al disclose the method of claim 16 further comprising adaptively adjusting said diffusing during said iterating according to said temporal diffusion map (Figs 3-5; Col 4 Ln 12-23 and Col 5 Ln 3-15).

As per claim 18, Yamada et al does not explicitly teach the method of claim 17 wherein said magnitudes of said first and second portions of said quantization error are adjusted during said iterating proportional (Col 3 Ln 45- Col 4 Ln 30 and Col 5 Ln 3-15).

However, Yamada et al does not explicitly teach to the magnitudes of motion vectors of said motion fields.

In the same field of endeavor, Tanaka et al teach the magnitudes of motion vectors of said motion fields (Col 27 Ln 19-22 and Col 30 Ln 15-19).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention was made to modify the invention of Yamada et al with the invention of Tanaka et al. The advantage of the invention of Tanaka et al is that it provides more efficient coding between frames in order to accurately process scene changes (Tanaka, Col 25 Ln 45-60).

12. Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada et al (US 5,543,855) in view of Damera-Venkata et al, "Adaptive Threshold Modulation for Error Diffusion Halftoning" in further view of Tanaka et al (US 6,148,101) in further view of Mulligan, Jeffrey B; "Methods for Spatiotemporal Dithering".

As per claim 4, the modified invention of Yamada et al disclose the method of claim 3.

However, the modified invention of Yamada et al does not explicitly teach wherein said generating further comprises applying a finite impulse response filter to said motion fields.

In the same field of invention, Mulligan teach wherein said generating further comprises applying a finite impulse response filter to said motion fields (Mulligan, Sec 3.3; paragraph 2, Ln 8-11).

The advantage of the modification is that the iterative algorithms are designed to find the visually optimal halftone.

As per claim 6, the modified invention of Yamada et al disclose the modified invention of the method of claim 3.

However, the modified invention of Yamada et al does not explicitly teach wherein said generating of said gain control map further comprises convolving said image intensities with a bandpass/highpass temporal filter.

In the same field of endeavor, Mulligan teaches wherein said generating of said gain control map further comprises convolving said image intensities with a bandpass/highpass temporal filter (Mulligan, Sec 3.3, paragraph 2, Ln 8-11).

The advantage of the modification is that the iterative algorithms are designed to find the visually optimal halftone.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chikaodili E. Anyikire whose telephone number is (571)

270-1445. The examiner can normally be reached on Monday to Friday, 7:30 am to 5 pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272 - 7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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